

Orange N. J. Nov. 12th 58

Professor Gray

Dear Sir: I received yours of the 5th duly & am much obliged to you for the information contained - I have confined my examinations to the plants of W. Tera. which I collected, and as I ~~had~~ before wrote, have made out a list of nearly 150 identical or closely representative species of which I have specimens of 92. But finding that almost, if not quite all differed more or less from their Eastern analogues I wished to dis cover the rule by which specific identity was governed -

I am aware of the general axiom that where varieties shade into one another gradually they are considered of one species of which we have an interesting example in Amelanchier Canadensis with its seven marked varieties -

But taking another example from Rosaceae, I cannot see that Spirea Douglasii Hkr. differs more from S. tomentosa Linn. than S. opulifolia B. mollis (S. ribifolia of Nutt.) does from the type of the species.

I judge principally from the characters given in the Fl. of N. St., which are there very analogous in the two examples, of which I have specimens.

Now as you use angles of divergence to express the differences, the question may be thus stated: How much divergence in any two specimens constitutes a specific distinction?

For even those which you call equal differ considerably in specimens from the two countries. I purposely selected species of various differences to see how you looked at the matter.

I am aware that the identity of species is now very much a subject of individual opinion, and there are no rules by which all can agree to be guided, but by discussing the subject and getting the opinions of all upon a limited but similar series of species we may arrive in time at some such rules.

When you have leisure I shall be glad to hear from you on this subject, but knowing your many engagements I am in no hurry for an answer, & hope you will postpone it as long

as convenient. I think we may call that *Astragalus* "serotinus" if the name is not pre-occupied as I collected it in flower late in October, though probably a second and unusual time of flowering.

If I understand your meaning you have united *Ranunculus glaberrimus* A. with *R. cynobulbosa*, but in my catalogue you retained the former name (plants collected in 1853).

There seems to be much confusion about *Fragaria chilensis* & the other species. If really found on the coast of N. St., it does not answer to Nutt's description of the fruit, which I found there quite as good as that of *F. vesca*, and the only difference I could perceive was the larger flowers and later fruit: on the sandy beach prairies, ripening in the end of July while on the narrow interior prairies near Vancouver strawberries were done by June 15th.

I have specimens in flower from various parts of the territory which I cannot distinguish by any fixed characters.

There are several other points in which I am in doubt, but it would make this too long to discuss them all here. In comparing living specimens with descriptions while on the west coast, I found many discrepancies which I have noted from time to time, and they might be of use to you.

In the *Lupine*, so abundant there I had a world of trouble but finally thought I had them nearly all decided according to your descriptions, when behold - I find that you name the specimens all but one different from my conclusions. The reason is apparently that though there are four or five very decidedly distinct when fresh, and entire, the fragments preserved lose their best characters in drying, and others are used not to be depended on. Hoping to hear from you I remain

Very Respectfully

Yours

A. Cooper

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